

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Currently Amended) A receiver for estimation ~~or~~ and compensation of phase imbalance or gain imbalance, the receiver utilizing a QPSK modulation and a modulation scheme based on a complex scrambling code, the receiver comprising:

means for estimating the phase imbalance or gain imbalance prior to symbol synchronization ~~and for providing estimated and compensated I and Q components of an incoming I/Q modulated signal for symbol synchronization~~ using at least one of a first value related to a cross correlation of an I component and a Q component of an incoming I/Q modulated signal, a second value related to a cross correlation of a compensated I component and a compensated Q component of the modulated signal, and a third value related to a square of the compensated I component and a square of the compensated Q component of the modulated signal; and

means for compensating the I and Q components of the incoming I/Q modulated signal to provide compensated I and Q components for symbol synchronization.

2. (Currently Amended) The receiver according to claim 1, wherein the first value ~~means for estimating the phase imbalance or gain imbalance before synchronization~~ ~~comprises means for generating at least one first ratio selected from the group consisting of a second ratio, a third ratio and a fourth ratio; wherein second first ratio is a ratio between a cross correlation of said I and Q components ( $\langle I, Q \rangle$ ) of the incoming I/Q modulated signal and a mean value of a square of the I component ( $\langle I^2 \rangle$ );~~ wherein the ~~third ratio~~ ~~second value~~ is a ratio between the cross correlation of the compensated I and Q components and a square root of a product between a mean value of the square of the compensated I component and a mean value of a square of the compensated Q component ( $((\langle I^2 \rangle \langle Q^2 \rangle)^{1/2})$ ; and wherein the ~~fourth ratio~~ ~~third~~

value is a ratio between the mean value of the square of the compensated Q component ( $\langle Q^2 \rangle$ ) and the mean value of the square of the compensated I ( $\langle I^2 \rangle$ ) component.

3. (Currently Amended) The receiver according to claim 1, wherein the means for estimating the phase imbalance or gain imbalance before synchronization comprises a low pass filter for low pass filtering the signals.

4. (Currently Amended) The receiver according to claim 1, ~~further comprising~~ where the means for compensating the I and Q components of the incoming I/Q modulated signal includes means for compensating the phase imbalance or gain imbalance before synchronization based on at least one first ratio selected from the group consisting of a second ratio, a third ratio and a fourth ratio; ~~wherein the second first~~ wherein the second ratio is a ratio between a cross correlation of said I and Q components ( $\langle I, Q \rangle$ ) of the incoming I/Q modulated signal and a mean value of a square of the I component ( $\langle I^2 \rangle$ ); ~~wherein the third ratio is a ratio between the cross correlation of the I and Q components and a square root of a product between a mean value of the square of the I component and a mean value of a square of the Q component~~ wherein the third ratio is a ratio between the cross correlation of the I and Q components and a square root of a product between a mean value of the square of the I component and a mean value of a square of the Q component ( $\langle I^2 \rangle \langle Q^2 \rangle^{1/2}$ ); ~~and wherein the fourth ratio is a ratio between the mean value of the square of the Q component~~ and wherein the fourth ratio is a ratio between the mean value of the square of the Q component ( $\langle Q^2 \rangle$ ) and the mean value of the square of the I ( $\langle I^2 \rangle$ ) component.

5. (Previously Presented) The receiver according to claim 1, wherein the receiver comprises a WCDMA (UMTS) receiver and wherein a feed-forward scheme or a feed-back scheme is established in the receiver.

6. (Previously Presented) The receiver according to claim 1, wherein the estimation of the phase imbalance or gain imbalance is carried out iteratively.

7. (Currently Amended) A method for estimation ~~or~~ and compensation of phase imbalance or gain imbalance in a receiver utilizing a QPSK modulation and a modulation scheme based on a complex scrambling code, the ~~demodulation~~ method comprising the step of:

estimating the phase imbalance or gain imbalance of an incoming I/Q modulated signal before symbol synchronization using at least one of a first value related to a cross correlation of an I component and a Q component of the modulated signal, a second value related to a cross correlation of a compensated I component and a compensated Q component of the modulated signal, and a third value related to a square of the compensated I component and a square of the compensated Q component of the modulated signal; ~~and~~

compensating the phase imbalance or gain imbalance ~~on the basis of the at least one first ratio~~ such that a feed-forward scheme or a feed-back scheme is established; and

~~wherein providing estimated and compensated I and Q components of an the incoming I/Q modulated signal are provided for symbol synchronization.~~

8. (Currently Amended) The method according to claim 7, further comprising ~~the step of~~:

determining at least one first ratio selected from the group consisting of a second ~~ratio~~ratio, a third ratio and a fourth ratio; ~~wherein the second first ratio is a ratio between a cross correlation of the I and Q components ( $\langle I, Q \rangle$ ) of an the incoming I/Q modulated signal and a mean value of a square of the I component ( $\langle I^2 \rangle$ );~~ wherein the third ratio is a ratio between the cross correlation of the I and Q components and a square root of a product between a mean value of the square of the I component and a mean value of a square of the Q component  $((\langle I^2 \rangle \langle Q^2 \rangle)^{1/2})$ ; ~~and wherein the fourth ratio is a ratio between the mean value of the square of the Q component ( $\langle Q^2 \rangle$ ) and the mean value of the square of the I ( $\langle I^2 \rangle$ ) component.~~

9. (Canceled)

10. (Currently Amended) The method according to claim 7, wherein estimating the phase imbalance or gain imbalance~~the estimation of the phase imbalance or gain imbalance is carried out~~ comprises estimating the phase imbalance or gain imbalance iteratively.

11. (Currently Amended) A computer readable storage medium storing instructions that, when executed, ~~program for estimation or compensation of estimate or~~ compensate phase imbalance or gain imbalance in a receiver utilizing a QPSK modulation and a modulation scheme based on complex scrambling code ~~comprising machine-readable code on machine-readable media~~ according to a method comprisingfor performing the step of:

estimating the phase imbalance or gain imbalance before symbol synchronization using at least one of a first value related to a cross correlation of an I component and a Q component of an incoming I/Q modulated signal, a second value related to a cross correlation of a compensated I component and a compensated Q component of the modulated signal, and a third value related to a square of the compensated I component and a square of the compensated Q component of the modulated signal; and

providing estimated and compensated I and Q components of ~~an~~ the incoming I/Q modulated signal for symbol synchronization.

12. (Currently Amended) A method, comprising:  
~~of~~ iteratively compensating a phase imbalance or gain imbalance in a receiver, the receiver utilizing a QPSK modulation and a modulation scheme based on a complex scrambling code, ~~comprising the steps of~~ the iteratively compensating including:

a) determining an error function on the basis of samples of phase compensated in-phase components and quadrature components of a revived I/Q modulated signal;

b) filtering the error function;

c) integrating the filtered error function;

d) determining a modified error function by adding the integrated and filtered error function to a product of the integrated and filtered error function and a parameter based on speed and stability;

e) determining a corrected output signal of the I/Q components of the received signal on the basis of subsequent samples of phase compensated in-phase components and quadrature components of the received I/Q modulated signal and the modified error function;

and

f) returning to step a)-); and

providing estimated and compensated I and Q components of ~~an incoming~~the received I/Q modulated signal to a symbol synchronizer for synchronization.

13. (Currently Amended) A method, comprising:

~~of~~ iteratively compensating a phase imbalance or gain imbalance in a receiver, the receiver utilizing a QPSK modulation and a modulation scheme based on a complex scrambling code, ~~comprising the steps of~~the iteratively compensating including:

a) determining an error function on the basis of squared samples of phase compensated in-phase components and quadrature components of a received I/Q modulated signal;

b) filtering the error function;

c) integrating the filtered error function;

d) determining a modified error function by adding the integrated and filtered error function to a product of the integrated and filtered error function and a parameter based on speed and stability;

e) determining a gain on the basis of a product of the modified error function and a factor;

f) determining a corrected output signal of the I/Q components of the received signal on the basis of subsequent samples of phase compensated in-phase components and quadrature components of the received I/Q modulated signal and the gain; ~~and~~

g) returning to step a)-); and

providing estimated and compensated I and Q components of ~~an incoming~~the received I/Q modulated signal to a symbol synchronizer for synchronization.

14. (Previously Presented) The receiver according to claim 1, further comprising means for symbol synchronization which receives the estimated and compensated I and Q components and performs synchronization of the components.

15. (Previously Presented) The receiver according to claim 14, wherein said means for synchronization comprises a Universal Mobile Telecommunications System (UMTS) synchronizer.

16. (New) The computer readable storage medium of claim 11, wherein the method further comprises:

determining at least one first ratio selected from the group consisting of a second ratio, a third ratio and a fourth ratio, wherein the second ratio is a ratio between a cross correlation of the I and Q components of the incoming I/Q modulated signal and a mean value of a square of the I component, wherein the third ratio is a ratio between the cross correlation of the I and Q components and a square root of a product between a mean value of the square of the I component and a mean value of a square of the Q component, and wherein the fourth ratio is a ratio between the mean value of the square of the Q component and the mean value of the square of the I component.

17. (New) The method of claim 12, wherein determining an error function on the basis of squared samples of phase compensated in-phase components and quadrature components of a received I/Q modulated signal comprises determining the error function using at least one of a first value related to a cross correlation of an I component and a Q component of the received I/Q modulated signal, a second value related to a cross correlation of a compensated I component and a compensated Q component of the modulated signal, and a third value related to a square of the compensated I component and a square of the compensated Q component of the modulated signal.

18. (New) The method of claim 12, further comprising:

determining at least one first ratio selected from the group consisting of a second ratio, a third ratio and a fourth ratio, wherein the second ratio is a ratio between a cross correlation of the I and Q components of the incoming I/Q modulated signal and a mean value of a square of the I component, wherein the third ratio is a ratio between the cross correlation of the

I and Q components and a square root of a product between a mean value of the square of the I component and a mean value of a square of the Q component, and wherein the fourth ratio is a ratio between the mean value of the square of the Q component and the mean value of the square of the I component.

19. (New) The method of claim 13, wherein determining an error function on the basis of squared samples of phase compensated in-phase components and quadrature components of a received I/Q modulated signal comprises determining the error function using at least one of a first value related to a cross correlation of an I component and a Q component of the received I/Q modulated signal, a second value related to a cross correlation of a compensated I component and a compensated Q component of the modulated signal, and a third value related to a square of the compensated I component and a square of the compensated Q component of the modulated signal.

20. (New) The method of claim 13, further comprising:  
determining at least one first ratio selected from the group consisting of a second ratio, a third ratio and a fourth ratio, wherein the second ratio is a ratio between a cross correlation of the I and Q components of the incoming I/Q modulated signal and a mean value of a square of the I component, wherein the third ratio is a ratio between the cross correlation of the I and Q components and a square root of a product between a mean value of the square of the I component and a mean value of a square of the Q component, and wherein the fourth ratio is a ratio between the mean value of the square of the Q component and the mean value of the square of the I component.